

What is claimed is:

1. An apparatus, comprising:

5 an inertial electrostatic confinement device operable to provide charged particles, said inertial electrostatic confinement device including a container;

a winding operable to provide a magnetic field to direct the charged particles; and

a pair of coils positioned within said container and inside said winding, said pair of coils being operable to control strength of the magnetic field between said pair of coils.

10 2. The apparatus of claim 1, wherein said inertial electrostatic confinement device includes at least one electrode positioned between said pair of coils.

3. The apparatus of claim 1, further comprising a plurality of electrically conductive rings
15 disposed adjacent said pair of coils within said container.

4. The apparatus of claim 1, wherein said coils are positioned relative to said inertial electrostatic confinement device to collimate at least a portion of the charged particles.

20 5. The apparatus of claim 1, wherein said pair of coils are operable to carry electric current in a direction opposite said winding to reduce the strength of the magnetic field.

6. The apparatus of claim 1, further comprising a stabilizing coil positioned between said pair of coils, said stabilizing coil being operable to carry an electric current in a direction opposite each of said pair of coils.

5 7. The apparatus of claim 1, further comprising an electrostatic energy converter positioned to receive at least a portion of the charged particles to provide electric power.

8. A method, comprising:

generating charged particles with a device performing a fusion reaction;

10 directing the charged particles along a channel with a magnetic field; and

operating a pair of coils in the magnetic field, the pair of coils being spaced apart from one another along the channel to control strength of the magnetic field in a space between the pair of coils.

15 9. The method of claim 8, wherein said operating includes collimating the charged particles with the pair of coils.

10. The method of claim 9, further comprising providing at least a portion of the charged particles collimated with the pair of coils to a magnetic mirror.

20 11. The method of claim 8, wherein said operating includes separating a first portion of the charged particles from a second portion of the charged particles with the pair of coils.

12. The method of claim 11, wherein said operating further includes separating the first portion of the charged particles into electrons and positively charged particles.

13. The method of claim 8, further comprising providing at least a portion of the charged particles to an electrostatic energy converter and providing electricity with the electrostatic energy converter.

14. The method of claim 8, wherein the device is of an inertial electrostatic confinement type, and further comprising:

positioning an electrode of the device between the pair of coils; and
providing a stabilizing coil between the pair of coils.

15. The method of claim 14, wherein said operating includes flowing electric current through the pair of coils in a direction opposite an electric current flowing through the stabilizing coil.

16. The method of claim 15, wherein said operating includes generating a hexa-pole magnetic field.

17. An apparatus, comprising:

a magnetic field generator operable to generate a magnetic field;
an inertial electrostatic containment device including at least one electrode; and

a pair of coils separated from one another to define a space therebetween, said at least one electrode being positioned in said space between said pair of coils, said pair of coils being operable to reduce strength of the magnetic field in at least a portion of said space.

5 18. The apparatus of claim 17, wherein said pair of coils are each generally circular, a first one of said pair of coils has a first radius and a second one of said pair of coils has a second radius approximately equal to said first radius.

19. The apparatus of claim 17, wherein said pair of coils are spaced apart from one another
10 by an distance corresponding to a radius of at least one of said pair of coils.

20. The apparatus of claim 17, wherein said at least one electrode has a generally spherical profile with openings to provide for a star mode of operation of said inertial electrostatic confinement device.

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21. The apparatus of claim 17, further comprising a container defining a chamber, said at least one electrode and said pair of coils being positioned in said chamber, said magnetic field generator including a winding disposed outside said chamber to provide the magnetic field to direct charged particles provided with said inertial electrostatic confinement device.

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22. The apparatus of claim 21, wherein said winding is operable to conduct current in a first direction, and said pair of coils are each operable to direct current in a second direction opposite said first direction to reduce strength of the magnetic field between said pair of coils.

23. The apparatus of claim 22, further comprising a stabilizing coil positioned between said pair of coils within said container, said stabilizing coil being operable to conduct current in said first direction.

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24. The apparatus of claim 23, further comprising an electrostatic energy converter operable to receive at least a portion of the charged particles to generate electric power.

25. An apparatus, comprising:

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a source to provide charged particles;

a winding operable to generate a magnetic field channel to direct the charged particles;

a pair of spaced apart coils operable to reduce strength of the magnetic field channel in a space between said pair of coils, said winding being disposed about said pair of coils; and

one or more charged particle collectors disposed adjacent said pair of coils and about the magnetic field channel when generated with said winding, said one or more charged particle collectors being operable to collect at least a portion of the charged particles for conversion to electrical power.

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26. The apparatus of claim 25, wherein said source includes one or more inertial electrostatic confinement devices.

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27. The apparatus of claim 25, wherein said pair of coils are each generally circular with approximately the same radius and said coils are spaced apart from one another by a distance approximated equal to said radius.

5 28. The apparatus of claim 25, wherein said charged particle collectors number at least two, a first one of said collectors being oriented to collect electrons and a second one of said collectors being oriented to collect positively charged ions to produce an electric current.

29. The apparatus of claim 25, wherein said one or more charged particle collectors number
10 more than one and include at least two electrically conductive rings positioned between said pair of coils.

30. The apparatus of claim 29, wherein a first one of the rings has a diameter equal to or greater than a diameter of a second one of the rings.

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31. The apparatus of claim 25, further comprising a container, said winding being disposed about said container.

32. The apparatus of claim 31, wherein said one or more charged particle collectors number
20 at least two and include a first collector in electrical contact with said container and a second collector at a different electric potential than said first collector during operation of said one or more charged particle collectors.

33. The apparatus of claim 25, wherein said one or more charged particle collectors number more than one and are configured as a plurality of conductive rings positioned in correspondence with accessibility regions of respective species of particles.

5 34. An apparatus, comprising:

a plurality of inertial electrostatic confinement devices each operable to provide charged particles, said inertial electrostatic confinement devices being located along a magnetic channel to direct the charged particles; and

an energy converter including one or more electrically conductive members in said
10 channel, said energy converter being operable to receive at least a portion of the charged particles to provide electric power.

35. The apparatus of claim 34, further comprising a container and one or more windings about said container operable to generate the magnetic channel.

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36. The apparatus of claim 35, further comprising a number of pairs of coils, said pairs each corresponding to a different one of said inertial electrostatic confinement devices, said pairs each being operable to reduce the magnetic field between a first member of the pair and a second member of the pair during operation of said winding.

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37. The apparatus of claim 36, further comprising a number of stabilizing coils each corresponding to a different one of said pairs of coils.

38. The apparatus of claim 34, wherein said energy converter includes a pair of coils and said one or more electrically conductive members include a number of charged particle collectors positioned about said channel.

5 39. The apparatus of claim 38, further comprising a container and wherein:
said winding is disposed about said container;
said coils and said charged particle collectors are disposed within said container; and
said charged particle collectors include a plurality of rings, a first one of said rings being
in electrical contact with said container and a second one of said rings being at an electric
10 potential relative to said first one of said rings.

40. The apparatus of claim 34, further comprising an expander positioned between said one or more inertial electrostatic confinement devices and said energy converter.

15 41. The apparatus of claim 40, wherein said energy converter includes a modulator and a decelerator, said decelerator including said one or more electrically conductive members.

42. The apparatus of claim 41, further comprising an energy converting separator positioned between said expander and said energy converter, said energy converting separator including two
20 coils spaced apart from each other and one or more charged particle collectors, said energy converting separator being operable to convert a first portion of the charged particles to electrical power and pass a second portion of the charged particles to said energy converter, particles of said first portion being of lower kinetic energy than particles of said second portion.